

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket No. 94-102
To Ensure Compatibility with	)	
Enhanced 911 Emergency Calling Systems	)	

To:     Wireless Telecommunications Bureau

**THIRD SEMI-ANNUAL REPORT OF  
VOICESTREAM WIRELESS CORPORATION ON ITS  
E911 IMPLEMENTATION PLAN**

VoiceStream Wireless Corporation ("VoiceStream"),<sup>1</sup> pursuant to the Fourth Memorandum Opinion and Order entered in this proceeding,<sup>2</sup> submits this Third Semi-Annual Report concerning the status of its Phase II implementation efforts and its technology trials of Phase II service. Although VoiceStream was required to submit reports semi-annually, in fact, it has provided updates more frequently because of the importance of this effort and the importance of sharing material developments with both industry and the public safety community.<sup>3</sup>

Recent handset trial results reconfirm that VoiceStream should amply comply with the Commission's initial one hundred meter accuracy requirements at service launch. Further, VoiceStream and public safety have together established an implementation plan consistent with

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<sup>1</sup> VoiceStream submits this Report on behalf of itself and other PCS licensees, both subsidiaries and affiliates, operating under the VoiceStream brand. A list of these licensees is attached as **Exhibit A**.

<sup>2</sup> See *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *Fourth Memorandum Opinion and Order*, FCC 00-236, 15 FCC Rcd 17442 (Sept. 8, 2000) ("*ALI Reconsideration Order*").

<sup>3</sup> See, e.g., First Semi-Annual Report (Oct. 2, 2000); Voice Stream Ex Partes (Nov. 6 and 8, 2000); Phase II Implementation Report (Nov. 9, 2000); Second Semi-Annual Report (April 2, 2001); VoiceStream Ex Parte (April 23, 2001); VoiceStream Ex Parte (July 6, 2001).

public safety's announcements regarding which communities will be able to utilize Phase II information first.

Critical software and equipment that VoiceStream had expected to receive in the latter half of 2001, which would have enabled VoiceStream to meet the original waiver deadlines, are being delivered late due to a variety of reasons, including the general economic and financial difficulties all vendors are experiencing currently, the complexity of integrating new nodes and vendors into an established network, the lack of comprehensive standardization, the immaturity of interfaces, and the lack of test equipment and test facilities. These vendor delays are outside of VoiceStream's control, despite firm vendor management.<sup>4</sup> Combined with other variables such as building code, zoning and leasing issues and local exchange carrier (LEC) preparedness, these delays have had a direct impact on VoiceStream's ability to deploy its Phase II solution (Enhanced Observed Time Difference or E-OTD) according to the timeframes previously outlined by the Commission. VoiceStream understands the gravity of its undertaking and has secured the commitment of its vendors to deliver Phase II solutions within the timeframes set out below.

## **I. INTRODUCTION AND SUMMARY**

The GSM community has adopted E-OTD as the global standard for providing customer location information for GSM and next generation GSM networks. GSM is the predominant air interface in the world. VoiceStream, which has a relatively small share of the global GSM business, has taken the lead in evaluating, testing and implementing E-OTD in GSM networks.

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<sup>4</sup> Cingular Wireless has also notified the Commission that, due to vendor delays in network equipment, live end-to-end testing of handsets will not be accomplished this year, and E-OTD handsets will not be commercially available until 2002. *See* Letter from Brian F. Fontes, Cingular Wireless, CC Docket No. 94-102 (September 28, 2001).

After the FCC issued its *First Report and Order* on wireless E911 in 1996, VoiceStream (and its predecessor companies, Aerial and Omnipoint) began evaluating all location technological possibilities for GSM.<sup>5</sup> At the time the Commissions issued its *First Report and Order*, there was an assumption that there would be a network solution to meet wireless carriers' obligation to locate users. When network solutions proved to be impractical, VoiceStream turned to a hybrid network/handset solution, E-OTD. VoiceStream worked with standards organizations to establish global E-OTD standards and with manufacturers to create manufacturer specifications for hardware and software starting in 1997. Since 1999, VoiceStream has been actively involved in testing and refining E-OTD — far longer than any other GSM carrier in the world.

VoiceStream has placed orders or made commitments for E-OTD technology totaling \$20 million for Fiscal Year 2001 alone. Planned activities for E-OTD in 2002 will exceed \$80 million. The E-OTD activities VoiceStream has undertaken will pay dividends not only to the other U.S. carriers that are now converting to GSM, but also to carriers and customers worldwide. On this subject, the Commission has adopted a leadership role the results of which will be realized globally. The experience that VoiceStream has gained from its extensive trials will prove invaluable to all other GSM carriers and will enable them to introduce E-OTD location capabilities at a far more rapid pace because of VoiceStream's pioneering efforts (and at a lower internal cost).

Recent results of VoiceStream's E-OTD trial in Houston show solid accuracy performance across a range of handset types. The Commission has required VoiceStream to support an initial roll-out location accuracy of 100 meters/67 percent of the time and 300 meters/95 percent

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<sup>5</sup> In fact, VoiceStream undertook development of a time of arrival ("TOA") system for GSM before deciding on E-OTD as the best option for GSM. This fact underscores the point that VoiceStream has thoroughly investigated all location technology options for GSM. Assertions to the contrary notwithstanding, there is no solution that will allow VoiceStream to comply with the FCC's accuracy requirements more effectively than E-OTD.

of the time.<sup>6</sup> Recent results of the Houston handset trial suggest that VoiceStream will more than amply comply with the network launch accuracy requirements. In addition, VoiceStream has commenced two new additional E-OTD technology trials — in Washington, D.C. and Seattle, Washington — which will be used to test E-OTD accuracy in new radio frequency environments.

VoiceStream is also working closely with national public safety organizations, especially with the APCO Project LOCATE team. VoiceStream shared its deployment strategy with the LOCATE team in July and August and has incorporated the team's comments in its First Office Application ("FOA") test plan. Under this plan, the first deployment of Phase II on each of VoiceStream's switch types will be completed as soon as each vendor is able to provide the equipment and software upgrades needed to support the Network Software Solution ("NSS") solution. Upgrading the Phase II system to E-OTD capabilities will quickly follow and will use the same PSAP interconnection as the NSS solution. VoiceStream and public safety will use this FOA experience to develop a comprehensive deployment plan that ensures the Phase II capabilities can be installed most efficiently for all involved. VoiceStream intends to keep the national public safety leadership and PSAPs requesting Phase II service informed of its progress as we move forward.

The economy, both here and abroad, has slowed. Both switch and handset vendors have been forced to lay off thousands of workers and reduce their budgets for development of new technologies, such as E-OTD. The development of software and hardware has slipped over the months from the dates originally forecast by the vendors. In some cases the delays have been due to the introduction of the new SignalSoft Gateway Mobile Location Center ("GMLC") ven-

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<sup>6</sup> See *ALI Reconsideration Order*, 15 FCC Rcd at 17463 ¶ 63.

dor and the need for interoperability testing. As illustrated in the chart below, all three of VoiceStream's major vendors have realigned their timelines since May 2001, when VoiceStream asked for firm project and pricing information:

	Latest Avail- ability Date	RFP – Date May 2001	Slippage
Ericsson Development			
R9.0 MSC/VLR	10/01/01	10/01/01	-
R9.0 BSS	11/01/01	11/01/01	-
MPS-G 4.0 (NSS)	01/01/02	10/01/01	3 Months
LMU Type A	12/15/01	2/28/02	-
MPS 5.0 (E-OTD) GA	07/31/02	2/28/02	5 Months
MPS-G 5.0 (Commercial System) GA	12/15/02	8/30/02	4 Months
Nortel Development			
MSC -GSM13	Sep-01	Sep-01	-
BSC-V12.4+	12/10/02	Jun-01	6 Months
SMLC-NSS	02/21/02	Jan-02	1 Month
SMLC-EOTD	07/20/02	Apr-02	3 Months
LMU-A	06/01/02	May-02	3 Months
Nokia Development			
S10 – BSC	01/15/02	12/15/01	1 Month
M10 - MSC	11/15/01 (M11)	Available	6 Months
LMU B	11/15/01	11/15/01	-

We have been working diligently with our vendors to establish reliable dates and have their commitment that they will promptly report if they should have any further slippage.

We anticipate that AT&T Wireless' and Cingular's decisions to convert their TDMA networks to GSM will spur faster development and deployment of E-OTD, as the U.S. E-OTD market has just become much larger. This adds extra impetus and resources to the manufacturers and standards bodies to complete the initial E-OTD development. We also anticipate that with the larger U.S. E-OTD customer base future technological advances will flow more rapidly.

VoiceStream's commitment to E911 Phase II implementation remains as strong as ever. VoiceStream's decision to deploy E-OTD has been further validated by recent test results. In the

coming months, VoiceStream will be delivering on its commitment to install E-OTD technology. The October 1, 2001 start date that the Commission established five years ago, however, has proven to be too challenging given the time allotted. Even so, the wireless industry has made great strides, as the National Emergency Number Association (“NENA”) recognized recently in its *Report Card to the Nation*:

Wireless E-9-1-1 has progressed rapidly since 1996. Investment in the development of location technologies has been substantial and several technologies have been developed and field tested.<sup>7</sup>

Based on everything that VoiceStream has learned (and barring unforeseen developments from its vendors and zoning officials or other obstacles to deployment), VoiceStream expects that it will have several First Office Application (“FOA”) tests of E-OTD ongoing in the first half of 2002. Deployment of the E-OTD functionality cannot start until its interim Network Software Solution (“NSS”) deployment is complete and PSAP interconnection and inter-working with the SignalSoft Gateway Mobile Location Center (“GMLC”) (which is essential to deliver both Phase I and Phase II PSAP information) are achieved. Deployment schedules for Nokia, Nortel and Ericsson will vary. Nokia will be able to start deployment as soon as the NSS installation is complete, and will have E-OTD equipment available in April 2002. Nortel will have NSS functionality ready for deployment in March 2002, and E-OTD equipment available in July 2002. Ericsson will have its NSS system tested and ready for deployment in April 2002 and have E-OTD equipment deployed by August 2002.

Based on delivery dates supplied by our vendors, we have developed an initial deployment schedule for the first group of NSS and E-OTD installations:

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<sup>7</sup> NENA, *Report Card to the Nation: The Effectiveness, Accessibility and Future of America's 9-1-1 Service*, at 13 (Sept. 11, 2001) (“NENA Report Card to Nation”).

- For Nokia markets, VoiceStream will be able to offer NSS Phase II service to 278 PSAPS<sup>8</sup> by the end March 2002. E-OTD service will be available to 41 PSAPs by August 2002.

- For Nortel markets, VoiceStream will have NSS Phase II capabilities in 183 PSAPs by April 2002, and will have E-OTD functionality available to 65 PSAP by December 2002.

- In Ericsson markets, VoiceStream will have NSS Phase II capabilities in 110 PSAPs by May 2002 and have E-OTD service available to 8 PSAPs by January 2003. Although VoiceStream has received just 56 PSAP requests, it will have NSS Phase II capabilities in over 570 PSAPs by the end of May 2002. By the end of the 2002, it will be able to offer high accuracy E-OTD service to 114 PSAPs if these PSAPs were able to take the service. The challenge for VoiceStream and its PSAPs is to coordinate in a manner where VoiceStream is asked to deliver Phase II capabilities only where PSAPs are capable of utilizing Phase II data, including any necessary upgrades to their 911 LEC networks.

Future handset penetration levels are proving to be much more difficult to predict. Last month, VoiceStream tested a number of E-OTD handsets on the Houston E-OTD test bed (as described in Section II.A). However, commercial handsets cannot be released into the market until full end-to-end testing on VoiceStream's network (with E-OTD network elements in place) has occurred, so that consumers, handset vendors, as well as VoiceStream are assured that no unforeseen technical issues arise. This is complicated by VoiceStream's need to ensure that handsets do not work only VoiceStream's network, but are able to operate, with or without E-OTD functionality, on other U.S. GSM networks and also on all international GSM networks worldwide.

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<sup>8</sup> As described more fully in footnote 20 below, "one" PSAP request may encompass a very large number of indi-

VoiceStream cannot engage in full end-to-end testing of these handsets until commercial grade E-OTD equipment has been installed and verified, vendor delivery of which, as just noted, will be delayed. Our best estimate is that we will be able to introduce three to four handsets into the market in the June 2002 timeframe, which will quickly allow us to achieve over 50 percent new activations of E-OTD capable handsets in a matter of weeks thereafter.

VoiceStream is disappointed in these developments, and it would have preferred that equipment promised for delivery in the summer would have timely arrived, rather than be delayed until the fall and winter. However, delays are being experienced not only by wireless operators but also by other essential participants in the delivery of Phase II to the public. For example, public safety is encountering delays “due in part to many factors ranging from the unavailability of public funds for enhancing the wireless 9-1-1 system to technological and educational barriers to implementation.”<sup>9</sup> No one is immune from these developments.

Given the challenge the Commission posed to industry in 1996 — identify the location of mobile customers when the technology to do so did not even exist — the fact that the Commission’s predictive judgment may be off by a matter of months is actually quite remarkable.

## **II. DEVELOPMENTS IN E-OTD TRIALS**

In September 2000, the Commission granted limited relief to VoiceStream to develop E-OTD, the location technology that had been incorporated in international GSM standards.<sup>10</sup>

VoiceStream had in fact been field testing E-OTD since 1999, and in May 2000 reported initial

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vidual public safety organizations. This schedule reflects that reality.

<sup>9</sup> *NENA Report Card to the Nation* at 10.

<sup>10</sup> See *ALI Reconsideration Order*, 15 FCC Rcd at 17463 ¶ 60.



field trial results to the Commission.<sup>11</sup> VoiceStream has conducted extensive testing in the intervening months, which is amply documented in the public record in this proceeding.

VoiceStream discusses below the results of more recent tests, and it also announces the commencement of two new E-OTD tests.

#### **A. The Houston Trial**

In its April 2001 Second Semi-annual Report, VoiceStream summarized the results of tests conducted from March 12 to 21, 2001.<sup>12</sup> It further advised the Commission that it planned to replace the developmental equipment at the Houston test-bed with commercial grade equipment.<sup>13</sup>

Since April, four distinct handset models (and eight handsets in total comprised of these various models) from three different handset vendors have been tested on VoiceStream's Houston test bed. These handsets reflect the progress made from initial prototype models that had previously been tested on the Houston test bed to initial commercial grade units. These units were tested in the July-August 2000 timeframe. Test results confirm VoiceStream's belief that, upon E-OTD launch, the accuracy of location measurements performed with E-OTD capable handsets will more than amply comply with the Commission's initial requirement that 100 meter accuracy for 67 percent of calls be attained. In fact, the test results show an average accuracy performance of 87 meters for 67 percent of calls for the handsets investigated.<sup>14</sup>

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<sup>11</sup> VoiceStream Ex Parte (May 2, 2000).

<sup>12</sup> See VoiceStream Second Semi-Annual Report at 5-6 (April 2, 2001).

<sup>13</sup> See VoiceStream Ex Parte (April 23, 2001).

<sup>14</sup> See **Appendix B** to this report for a more comprehensive description of the most recent Houston trial results, as well as descriptions of the two new trials to be commenced by VoiceStream and described below.

## **B. The Washington, D.C. Trial**

Following several months of planning, on Monday, October 1, 2001, VoiceStream commenced installation of a new E-OTD trial equipment in Washington, D.C.<sup>15</sup> VoiceStream chose Washington, D.C. in part to examine E-OTD performance in a more urban setting, and as a precursor to the Ericsson FOA, which is due to start in 2002. This trial will use newer versions of the Location Measurement Units (“LMUs”) manufactured by Cambridge Positioning Systems (“CPS”). (LMUs are the equipment installed at base stations to measure the time of signal transmission so the Serving Mobile Location Center (“SMLC”) can calculate customer location.) In addition, VoiceStream will install GPS timing devices at each of its LMUs, which will provide timing accuracy and additional network stability.<sup>16</sup> VoiceStream anticipates that these upgrades will also result in improved accuracy measurements. The first phase of the Washington, D.C. trial will encompass an area of 75 square kilometers around the downtown D.C. area; the second phase will extend to 129 square kilometers and also encompass portions of suburban Maryland and Virginia.<sup>17</sup>

## **C. Seattle E-OTD Trial**

On September 26, 2001, VoiceStream also commenced an E-OTD trial in Seattle, Washington. The Seattle trial encompasses an area of sixty square kilometers.<sup>18</sup> This trial is im-

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<sup>15</sup> The start of this trial is later than VoiceStream had previously announced due to building code, zoning and leasing problems with some sites, equipment delays and shortages, and the need to maintain the Houston network for handset testing. The LMUs from the Houston testbed are being reused in Washington, D.C., prior to being upgraded with the latest software and hardware modules later this year. In addition, the terrorist attacks of September 11, 2001 and resulting enhanced security measures in Washington, D.C. have hampered VoiceStream’s ability to gain access to sites.

<sup>16</sup> In Houston, each LMU operates using its own clock in reference to LMU clocks in adjacent cell sites. By using GPS timing in D.C., all the LMUs will be operating to the exact same time.

<sup>17</sup> **Exhibit B** includes a map depicting the phases of the Washington, D.C. trial.

<sup>18</sup> **Exhibit B** contains a map depicting the Seattle test area.

portant as it will permit VoiceStream to evaluate E-OTD in a different (more hilly) environment. In addition, this trial will be the first opportunity for VoiceStream to test LMUs manufactured by Nokia. The trial is currently using developmental LMUs from Nokia. The parties hope to begin using commercial grade LMUs from Nokia in December 2001.

### **III. PSAP STATUS**

VoiceStream is working closely with national public safety organizations, especially with the Project LOCATE team sponsored by the Association of Public Safety Communications Officials ("APCO"). VoiceStream shared its deployment strategy with the Project LOCATE team in July and August, and has incorporated the team's comments in its overall FOA planning. Under this plan, the first deployment of Phase II on each of VoiceStream's switch types will be completed as soon as the vendors are able to provide their modifications. VoiceStream and public safety will use this FOA experience to develop a more comprehensive deployment plan that ensures Phase II can be implemented most efficiently for all involved. VoiceStream intends to keep the national public safety leadership and public safety answering points ("PSAPs") requesting Phase II service informed of its progress as we move forward.

A. Phase I E911 Service. VoiceStream has made significant progress in its efforts to deploy Phase I cell site/sector E911 location service. Excluding the 70 requests received from PSAPs outside its service area, VoiceStream has received Phase I requests from 543 PSAPs in our coverage area—or approximately 11 percent of the 5,000 PSAPs nationally as reported in the NENA *Report Card to the Nation*.<sup>19</sup> Approximately 55 percent of these Phase I requests have been implemented or are awaiting implementation. VoiceStream is in active negotiations to

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<sup>19</sup> National Emergency Number Association, *Report Card to the Nation: The Effectiveness, Accessibility and Future of America's 9-1-1 Service*, at 5 (Sept. 11, 2001),

identify the specific details of the implementation approach to be used for another 31 percent of the requests. About 15 percent of the Phase I requests have been put “on hold” by the requesting PSAPs for a variety of reasons, including technical inability to utilize Phase I information, lack of PSAP cost recovery, or low numbers of subscribers in the PSAP jurisdiction. VoiceStream will resume negotiations and implementation on these requests with the PSAPs, once they are ready to proceed.

B. Phase II E911 Service. Excluding the six requests from PSAPs outside its service area, VoiceStream has received a total of 56 requests for Phase II service. This represents approximately one percent of the 5,000 PSAPs nationally. To date, only 14 (32 percent) of these requesting PSAPs have responded to our request to verify their readiness and the readiness of their E911 network. This verification is important because it helps to ensure that VoiceStream focuses its implementation efforts in areas where these efforts will produce tangible results — namely, the public will actually receive the benefits of Phase II location information. Thus far only three PSAPs (5 percent of our requests) who requested Phase II have confirmed that they are not ready to proceed at this time.

VoiceStream has worked with the APCO Project LOCATE team to prioritize Phase II implementations as follows:<sup>20</sup>

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<sup>20</sup> In point of fact, implementing a Phase II request is more complicated than it might first seem. As illustrated in **Exhibit C** for Houston, Texas, “one” PSAP request will generally require delivery of Phase II information to a number of individual PSAP organizations (21 for Houston). Further, VoiceStream’s decision to implement NSS in advance of E-OTD and regardless of a PSAP request may require delivery of NSS location information to dozens upon dozens of individual PSAP organizations.

### **Preliminary VoiceStream E-OTD Deployment Plan**

<b><u>Nokia Markets</u></b>	<b><u>Nortel Markets</u></b>	<b><u>Ericsson Markets</u></b>
Houston, TX (FOA)	Denton County, TX (FOA)	Washington, D.C. (FOA)
Minneapolis, MN	Richardson, TX	Anne Arundel Co., MD
Orange County, FL	Tarrent, TX	Knox County, TN
St. Louis County, MO	Dallas, TX	Palm Beach, FL
WA State Police	Douglas County, CO	State of Rhode Island

Further, VoiceStream believes at this time, based on vendor delivery plans, that the following start dates for First Office Applications (“FOA”) are realistic:

<u>PSAP</u>	<u>MSC/BSC Vendor</u>	<u>Start Date</u>
Houston, TX	Nokia	February 6, 2002
Denton County, TX	Nortel	May 21, 2002
Washington, D.C.	Ericsson	June 30, 2002

The start dates for “live” commercial traffic in Houston, Texas, Denton County, Texas, and Washington, D.C. will be finalized when PSAP and E911 LEC network equipment is in place and fully tested and when both the PSAP and VoiceStream are comfortable with activating the new technology. The experience these three PSAPs and VoiceStream will gain from this effort will prove invaluable to other PSAPs as additional E-OTD installations are made elsewhere.

It is important to emphasize that PSAPs face their own set of challenges in implementing Phase II service. According to NENA, “[m]ore than 90% of 9-1-1 networks use outdated analog technology,” these analog networks are being “strained because [they] are performing beyond original design,” yet “the cost of converting from analog to digital is often seen as prohibitive by 9-1-1 authorities, many of whom have limited funding.”<sup>21</sup> ALI databases constitute a “critical component” of Phase II service, yet it appears that few LECs are upgrading their ALI databases

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<sup>21</sup> NENA Report Card to the Nation at 16.

to include the “E2 interface” that PSAPs will need to consistently receive Phase II location information.<sup>22</sup> As NENA has noted:

The challenge is to create an environment where the LEC has an economic means to deploy newer technologies and services, created by the PSAP’s ability to purchase them. . . . Originally built for wireline service only, the 9-1-1 system must be “reinvented” to accommodate new technologies, increased competition and other institutional changes, at a cost likely to exceed current levels of public funding.<sup>23</sup>

It is not encouraging when a national public safety association assigns a grade of D for “the future outlook of 9-1-1, primarily because of the inability [of PSAPs] to respond to technological changes.”<sup>24</sup>

Punctuating this issue even further, two weeks ago national public safety organizations expressed “concern” to the FCC over the role of the LECs, whose participation “is essential to close the connection between wireless subscribers, carriers, databases, and PSAPs”:

Now that various elements of wireless E9-1-1 are finally falling in place, it is becoming increasingly evident that LEC cooperation remains a missing link in some instances. We reiterate our call on the Commission and other relevant state and federal policy makers to address this issue quickly and decisively.<sup>25</sup>

Unless this issue is recognized and addressed, the benefits of Phase II to the public will be delayed.

#### **IV. STATUS OF PHASE II IMPLEMENTATION**

An operational E911 Phase II location capability can be available only upon the completion of three separate activities: (1) the wireless carrier’s network must be Phase II compatible; (2) PSAP equipment and the E911 network must be Phase II compatible; and when these two

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<sup>22</sup> *Id.* at 6.

<sup>23</sup> *Id.* at 17 and 18.

<sup>24</sup> *Id.* at 16.

<sup>25</sup> Additional Ex Parte Comments of APCO, NENA and NASNA, Docket No. 94-102, at 4 (Sept. 21, 2001).

activities are completed, (3) interconnection of the wireless carrier network with the E911 network coupled with the exchange of pertinent data and necessary translation work so E911 calls and location data can be routed to the correct PSAP. VoiceStream below summarizes the current status of its effort to make its network Phase II compatible, which involves only one of the three steps necessary for an operational E911 system.

#### **A. Phase II Network Upgrades**

VoiceStream is deploying a Phase II solution which consists of two components: (1) its more precise E-OTD solution, which requires use of E-OTD compatible handsets and (2) the “safety net” NSS solution, which provides an interim Phase II capability which can be deployed more quickly than E-OTD, with better accuracy than the cell site/sector information available in Phase I. PSAPs can use NSS before E-OTD becomes available in their area or, after E-OTD is deployed, in conjunction with E911 callers that do not use E-OTD handsets. VoiceStream has been informed, however, that some PSAPs may not use location data based on NSS, preferring to wait for E-OTD accuracy before implementing Phase II.<sup>26</sup> VoiceStream, however, will not delay in installing NSS throughout its network, as required by the Commission, as promptly as possible.

NSS and E-OTD share many of the same network elements, with E-OTD additionally requiring LMUs installed at base stations. VoiceStream therefore addresses first the network elements that NSS and E-OTD share, after which it reviews the LMUs required specifically for E-OTD.

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<sup>26</sup> During an August 24, 2001 meeting with APCO and NENA, VoiceStream was informed that some PSAPs plan to refuse the NSS solution because they feared accepting location data with less accuracy than FCC rules require would increase their liability. Although this has not yet been confirmed by individual PSAPs, we have no reason to doubt it will happen when deployments begin.

## 1. Network Infrastructure Shared by E-OTD and NSS

NSS and E-OTD each require use of the same following network infrastructure components:

- (a) New Mobile Switching Center (“MSC”) and Base Station Controller (“BSC”) software
- (b) New Serving Mobile Location Centers (“SMLCs”), both hardware and software; and
- (c) New Gateway Mobile Location Centers (“GMLCs”), both hardware and software.

The status of each of these network elements is reviewed below.

(a). MSC and BSC Software. The software for both the MSCs and the BSCs must be modified for both E-OTD and NSS as new messaging is defined between these nodes and the new SMLC, GMLC and E-OTD handsets. The scale of the changes to the network is quite significant. VoiceStream has three MSC and BSC vendors: Ericsson, Nokia, and Nortel.

VoiceStream has encountered delays in receiving the necessary software from the vendors, and the vendors face a daunting task in integrating and testing the new hardware and software. The following chart illustrates MSC and BSC software availability timelines from the three vendors:

Vendor	Testing Available Date	Generally Available Date
Ericsson MSC - R9	10/01/01	01/01/02
Ericsson BSC - R9	11/01/01	02/01/02
Nokia MSC– M11	11/15/01	02/15/02
Nokia BSC - S10	01/15/02	04/15/02
Nortel MSC – GSM13	available	available
Nortel BSC – V12.4+	12/10/02	03/03/02



VoiceStream first tests the software in its laboratory, so that bugs can be identified and corrected by the vendor. Once lab testing is completed and all identified errors fixed, VoiceStream installs the software in one of its operational MSCs and/or BSCs to confirm that the software works and does not adversely affect other services or features — a process known as First Office Application (“FOA”). Once the FOA is successfully completed, VoiceStream considers the software “generally available,” ready for installation throughout its network in other MSCs and BSCs. For purposes of the “Generally Available Date” in the table above, VoiceStream has assumed that lab testing and FOA (including additional vendor modifications) can be successfully completed three months after the vendor delivers its hardware and preliminary software to VoiceStream’s laboratory. Once new software becomes “generally available,” VoiceStream needs some time to install the software throughout its network (*e.g.*, all MSCs and BSCs).

(b) Serving Mobile Location Centers. Serving Mobile Location Centers (“SMLCs”) are the equipment that will perform the location calculations for both NSS and E-OTD. VoiceStream requires different SMLC hardware and software from each MSC/BSC vendor, as the SMLC has to interact with both the handset to be positioned and each of the network elements -- MSC, BSC, Home Location Register (“HLR”) and LMUs. SMLC functionality will be available based on the following timetable:

Vendor	Testing Available Date	Generally Available Date
Ericsson SMLC - NSS	01/01/02	04/01/02
Ericsson SMLC –E-OTD	05/31/02	07/31/02
Nokia SMLC - NSS	11/15/01	03/22/02
Nokia SMLC - EOTD	01/15/02	03/22/02
Nortel SMLC - NSS	12/10/02	03/10/02
Nortel SMLC - EOTD	05/21/02	07/20/02

Following the completion of the FOA trials (i.e., the Generally Available Date), E-OTD installation can start in markets with existing PSAP requests. Installation and deployment of E-OTD requires site-by-site visits, amendment of leases, new zoning approvals for measurement and GPS antennas, hardware installation, and, finally, commissioning and optimization. Our experience suggests it may take six to nine months to complete the current outstanding PSAP requests.

(c) Gateway Mobile Location Centers. The Gateway Mobile Location Center (“GMLC”) is the interface between VoiceStream’s network and the various E911 networks. VoiceStream will be using the SignalSoft GMLC, which will also support the NCAS Phase I delivery required by many PSAPs with older equipment and networks. The use of the SignalSoft GMLC solves the Phase I delivery issue that VoiceStream had previously encountered, but also introduces a new vendor into the network. All three existing vendors must carry out “interoperability” testing of MSC, HLR and SMLC elements with the new SignalSoft GMLC, which contributes to the delay in introducing SMLC functionality into the network.

## **2. The LMUs Required for E-OTD**

E-OTD (but not NSS) requires the installation of Location Measurement Units (“LMUs”) at most base stations within and immediately surrounding the service area of a PSAP requesting Phase II service. LMU installation requires that two additional antennas be added to most of the base stations in the network. LMUs monitor the transmissions of other base stations in the network by way of a Measurement Function Receiver. The LMUs also require a small GPS receive antenna at each site to establish consistent system timing. In addition, LMUs can be internal or external to the BTS. The addition of antennas for the LMU and any external LMUs may trigger renegotiation of site leases and new zoning and construction permits that may delay installation.

LMUs will be available to VoiceStream for preliminary testing beginning November/December 2001, as illustrated in the chart below:

Vendor	First Availability Date
Ericsson LMU (external)	12/15/01
Ericsson LMU (internal)	06/15/02
Nokia LMU (internal)	11/15/01
Nortel LMU (internal)	06/01/01

Functional testing of the LMUs will be carried out once the SMLCs are available. Wide scale deployment of LMUs cannot begin until near the completion of the SMLC testing due to the interaction between the LMU and SMLC.

In most cases, VoiceStream (and other carriers deploying E-OTD) will need to secure both approval from the landowner from whom VoiceStream has secured rights to place existing equipment, and from the relevant zoning and building department officials, before this additional

equipment can be placed on either an antenna support structure or building. Leases for wireless communications facilities typically limit the amount of equipment – sometimes even the number of antennas – that can be placed on a site. VoiceStream has received indications from some landowners that they intend to demand up to one hundred percent more compensation per site for the additional MFR and GPS antennas. Additionally, many collocated antenna support structures simply cannot support additional antennas. During VoiceStream's trial deployment activities detailed above, at least one landowner refused to allow VoiceStream to add the equipment necessary for Phase II functionality to the site.

While the permitting jurisdictions involved in the FOA deployment have been cooperative to date, approval has not been without conditions, including restrictions on placement and screening. Placement of the additional antennas on "stealth" sites, where antennas are disguised as, for example, flagpoles, architectural details, or foliage could negate the stealth design and may be prohibited by the relevant land-use code. If LMU antennas cannot be deployed on a certain percentage of sites due to land-use or leasing restrictions, there may be adverse effects on the accuracy of the location data produced.

#### **B. E-OTD Handset Availability**

E-OTD also requires the use of specially equipped handsets. E-OTD handsets contain special software designed to perform time of arrival measurements of available base station transmissions, and to transmit these measurements through the network to the SMLC where the position estimate is computed.

On July 2, 2001, VoiceStream advised the Commission that it anticipated receiving for testing the following new E-OTD mobile units on the following dates:

<u><b>Vendor</b></u>	<u><b>Model</b></u>	<u><b>Available For Test</b></u>
Motorola	Baracuda	01-Sep-01
Nokia	3390	3Q01
Ericsson	TBD	2Q02

Significant progress has been made toward commercial availability for both the Motorola and Nokia handsets identified in July. Both have been tested on VoiceStream's Houston test bed (using a non-standard signaling interface) and both have undergone limited testing in Nokia's switch lab. While there has been significant progress, neither handset has been able to be tested by VoiceStream in the final software configuration, due to the described lack of availability of the network infrastructure hardware and software components. As noted, the Houston test bed was comprised of non-commercial grade equipment, and did not support the standard signaling interfaces necessary for full commercial release of E-OTD handsets because the commercial grade network elements supporting the standard interfaces were not available. While the Houston test bed is invaluable to verify the accuracy performance of E-OTD, it is not sufficient to verify final commercial grade handset software.

E-OTD (or any complex new technology) must be tested as a complete system (handsets and network elements) before final verification and commercial release may be contemplated. In order to qualify for release to customers, new handsets equipped with E-OTD software must undergo a rigorous test regime consisting of (a) the vendor's internal verification process, (b) interoperability testing in VoiceStream's labs, and (c) field verification of accuracy performance. Each of these steps requires the availability of the E-OTD network components (or a complete network simulator) in order to complete the testing. As has been stated, the network elements to implement E-OTD are simply not available to VoiceStream at this time and only partially avail-

able to the vendors themselves. Presently, the Motorola and Nokia handsets are undergoing step (a) in the testing process. We are convinced that these tests are progressing well, but VoiceStream does not expect to have these handsets available for steps (b) and (c) (above) until December.

Since July, VoiceStream has further developed plans for release of additional E-OTD capable handsets. The following table shows the anticipated availability for testing of handsets with E-OTD software. The process for commercial release of any of these handsets is as described above.

<b><u>Vendor</u></b>	<b><u>Model</u></b>	<b><u>Available For Test</u></b>
Motorola	T194 Low-tier	Dec 01
Nokia	3390 Low-tier	Dec 01
Samsung	TBA Low/Mid-tier	2Q02
Nokia	TBA Mid-tier	Dec 01
Motorola	TBA Mid-tier	1Q02

The first three E-OTD capable handset models (above) are expected in VoiceStream's labs in December. Lab testing on the Nokia infrastructure can proceed immediately followed by field tests on the Seattle trial system (mid-January) and the Houston FOA system (February). Final approval of the handsets for customer activation, however, is currently dependent on the need for end-to-end for testing with the infrastructure hardware and software elements from VoiceStream's other network providers. Given the recent new information concerning delays in the availability of E-OTD network elements described above, VoiceStream does not presently have commitments or agreements from its handset vendors for final approval of E-OTD handsets

based on testing with only one infrastructure vendor.<sup>27</sup> We are actively pursuing such commitments and agreements and we will provide this information to the Commission as soon as it is available.

Based on VoiceStream's best understanding of the availability of E-OTD network hardware and software elements, as described above, VoiceStream currently estimates beginning shipments of E-OTD handsets in June 2002. With the three planned handset models, VoiceStream expects that the activation percentage will quickly within a matter of weeks rise above 50 percent. Of course, VoiceStream intends to continue working aggressively with its vendors to improve both the availability dates and activation percentages and as new information becomes available will inform the Commission.

Going forward, VoiceStream expects that the supply of commercial grade E-OTD mobiles will increase significantly, given AT&T and Cingular's decision to convert to GSM and, accordingly, use E-OTD. The recent economic downturn nevertheless makes it increasingly difficult to predict handset vendor production levels and consumer purchase decisions. It is more difficult given the present economic circumstances to predict when VoiceStream can sell only E-OTD handsets -- a March to June 2003 timeframe may be possible, unless the market quickly rebounds.

## **VII. CONCLUSION**

NENA was correct when it advised Congress earlier this month that "Phase II is not a flash-cut process" and is rather "a work in progress":

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<sup>27</sup> Both Nokia and Motorola have communicated to VoiceStream that commercial availability of E-OTD handsets will be delayed, because the necessary E-OTD network elements to perform live network testing of these handsets are unavailable. See **Exhibit D** (Nokia) and **Exhibit E** (Motorola) to this report.

The October 1, 2001 date for phased-in deployment of Phase II is fast approaching, yet current estimates are that it will be as many as 4 years before Phase II is fully implemented.<sup>28</sup>

It took twenty years before landline 911 was available to fifty percent of all Americans. Completing wireless Phase II service by 2005 is a major challenge, but it would also represent a remarkable achievement. As this report demonstrates, VoiceStream by its actions has clearly embarked down the path toward attainment of that objective.

Respectfully submitted,

**VOICESTREAM WIRELESS CORPORATION**

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<sup>28</sup> *NENA Report Card to the Nation* at 13.